Claims

Original claims 1-33, 36-58, 60-78 and currrently amended claims 34, 35, and 59 remain in the application as follows:

1(Original). A stabilized laser system comprising:

at least one laser; and

a main transmission filter and a feedback transmission filter, each transmission filter having first and second ports with the first ports of both transmission filters being coupled to the at least one laser, and each of the transmission filters comprising a different spectral wavelength response as a function of wavelength;

the second port of the main transmission filter being coupled to an output of the stabilized laser system; and

a feedback arrangement comprising one of a group consisting of a reflector coupled to the second port of the feedback transmission filter, and a loop coupled between the second ports of the main and feedback transmission filters.

2(Original). The stabilized laser system of claim 1 wherein the main and feedback transmission filters comprising one of a group consisting of (a) separate sections of a single transmission filter, and (b) separate first and second transmission filters, respectively.

3(Original). The stabilized laser system of claim 1 wherein:

the at least one laser comprises a plurality of n lasers;

the main and feedback transmission filters comprising one of a group consisting of (a) separate multiplexer sections of a single multiplexer, and (b) separate first and second multiplexers, respectively; and

each multiplexer having a plurality of n first ports coupled to corresponding ones of the plurality of n lasers, and said second port.

4(Original). The stabilized laser system of claim 3 wherein each multiplexer comprises one of a group consisting of an Arrayed Waveguide grating, Eschelle grating, Mach-Zehnder interferometer, bulk grating, thin film filters, and optical fiber filters.

5(Original). The stabilized laser system of claim 1 wherein:

the at least one laser comprises a plurality of n lasers:

the main transmission filter is a forward multiplexer comprising a plurality of n first and fifth ports, and second, third, and fourth ports, the plurality of n first ports being coupled to corresponding ones of output ports of the plurality of n lasers;

the feedback transmission filter is a feedback multiplexer comprising a plurality of n first ports and a second

port, the plurality of n first ports being coupled to the plurality of n fifth ports of the forward multiplexer;

a reflector coupled to the second port of the feedback multiplexer;

a power splitter comprising first, second, third and fourth ports, the first, third, and fourth ports port being coupled to the second, third, and fourth ports of the forward multiplexer, and the second port being coupled to an output of the laser system; and

the power splitter causing a signal received at each of the first and fourth ports to be split into first and second portions that are delivered to the second and third ports thereof, respectively, and a signal received at third port is split into first and second portions that are delivered to the first and fourth ports thereof, respectively.

6(Original). The stabilized laser system of claim 5 wherein each multiplexer comprises one of a group consisting of an Arrayed Waveguide grating, Eschelle grating, Mach-Zehnder interferometer, bulk grating, thin film filters, and optical fiber filters.

7(Original). A stabilized laser system for generating a signal at an output thereof having a desired wavelength comprising:

at least one laser; and

means coupled to the at least one laser for generating, from a portion of a signal generated thereby, a feedback signal having a wavelength that is different from the desired wavelength

and feeding the feedback signal back to the laser for stabilizing the laser system at the desired wavelength.

8(Original). A stabilized laser system for generating a signal at an output thereof having a desired center wavelength comprising:

at least one laser, which, while emitting light and having a preselected portion thereof fed back thereto, causes the output signal of the at least one laser source to be shifted in wavelength in a first direction which is spaced apart from the center wavelength of the fed back signal; and

means coupled to the at least one laser for generating a feedback signal having a spectral response peaking at a wavelength shifted in an opposite direction to the first direction generated by at least one laser in response to the feedback signal so as to provide an output signal at the output of the stabilized laser system having a spectral response that peaks essentially at the desired wavelength.

9(Original). The stabilized laser system of claim 8 wherein an entire path of the feedback signal generating means in which the feedback signal for the at least one laser is propagating must preserve a polarization state of the feedback signal.

10(Original). The stabilized laser system of claim 8 wherein:

the at least one laser is a single laser, and

the feedback generating means comprising:

a main transmission filter having a first filter spectral response as a function of wavelength and coupled in a first signal path between an output port of the laser and the output of the stabilized laser system;

a power splitter coupled in the signal path between an output of the laser and the output of the stabilized laser system for splitting the output signal from the laser received at a first port thereof into first and second portions, the first portion being directed to a second port thereof and transmitted along the first signal path towards the output of the stabilized laser system, and the second portion being directed to a third port thereof and transmitted along a second signal path; and

a feedback transmission filter comprising a second spectral response peaking at a wavelength that is shifted in an opposite direction to the first direction for receiving the second portion from the power splitter at a first port thereof and generating therefrom a filtered output signal at a second port thereof that is coupled back to the output of the laser along one of a group consisting of the first signal path and the second signal path.

11(Original). The stabilized laser system of claim 10 wherein the power splitter is formed from one of a group consisting of a directional coupler (DC), a multimode interference (MMI) coupler, asymmetric Y junctions, a Mach-Zehnder interferometer, and free space optics using thin film.

12(Original). The stabilized laser system of claim 10 wherein the feedback signal generating means further comprises one of a group consisting of a reflector for returning the signal from the second port of the feedback transmission filter back to said second port and then through the power splitter to the output port of the laser, and a loop for coupling the signal from the second port of the feedback transmission filter back through the main transmission filter and the power splitter to the output port of the laser.

13(Original). The stabilized laser system of claim 10 wherein:

the power splitter is coupled in the signal path between one of a group consisting of an output of the laser and the main transmission filter and the main transmission filter and the output of the laser system, and splits any signals received concurrently at the second and third ports from the first and second paths, respectively, that are propagating towards the laser into first and second portions thereof, the first portion being coupled back to the laser as the feedback signal and the second portion being delivered to a fourth port of the power splitter; and

the feedback signal generating means further comprises:

a second feedback transmission filter comprising a third filter spectral response as a function of wavelength for receiving at a first port thereof a signal appearing at the fourth port of the power splitter and generating therefrom a filtered output signal at a second port thereof; and

a reflector coupled to the second port of the second feedback transmission filter for returning a reflected signal back through the second feedback transmission filter to the fourth port of the power splitter.

14(Original). The stabilized laser system of claim 10 wherein:

the power splitter is coupled in the signal path between an output of the laser and the main transmission filter; and

the feedback signal generating means further comprises a second power splitter coupled between the main transmission filter and the output of the stabilized laser system for receiving at a third port thereof the output signal from the second port of the feedback transmission filter and directing said output signal via a first port thereof back through the main transmission filter and the first power splitter as the feedback signal to the laser.

15(Original). The stabilized laser system of claim 14 wherein:

the first power splitter splits any signals received from the main transmission filter at the second port thereof and the first feedback transmission filter at the third port thereof into first and second portions thereof, the first portion being directed back to the laser as a feedback signal and the second portion is delivered to a fourth port thereof;

the second power splitter splits the signals received from the second port of the first feedback transmission filter

into first and second portions, the first portion being transmitted back through the main transmission filter and the first power splitter to the laser as the feedback signal, and the second portion being delivered to a fourth port of the second power splitter; and

the feedback signal generating means further comprises:

a second feedback transmission filter comprising a third filter spectral response for receiving at a first port thereof a second portion of the output signal from the fourth port of the second power splitter and generating therefrom an output signal at a second port thereof; and

a third feedback transmission filter having a fourth filter spectral response for receiving at a first port thereof a portion of the output signal from the fourth port of the first power splitter and generating therefrom an output signal at a second port thereof; and

first and second reflectors that are coupled to the second ports of the second and third feedback transmission filters, respectively.

16(Original). The stabilized laser system of claim 14 wherein each of the first and second power splitters is formed from one of a group consisting of a directional coupler (DC), a multimode interference (MMI) coupler, asymmetric Y junctions, a Mach-Zehnder interferometer, and free space optics using thin film.

17(Original). The stabilized laser system of claim 14 wherein:

the first power splitter is serially coupled between the main transmission filter and the second power splitter: and

the feedback signal generating means further comprises:

a second feedback transmission filter comprising a third filter spectral response for receiving at a first port thereof a second portion of the output signal from the fourth port of the second power splitter and generating therefrom an output signal at a second port thereof;

a third feedback transmission filter having a fourth filter spectral response for receiving at a first port thereof a portion of the output signal from the fourth port of the first power splitter and generating therefrom an output signal at a second port thereof; and

first and second reflectors that are coupled to the second ports of the second and third feedback transmission filters, respectively.

18(Original). The stabilized laser system of claim 8 wherein:

the at least one laser comprises a plurality of n lasers that generate separate wavelength output signal, and

the feedback signal generating means comprises a forward multiplexer coupled in a first signal path between an output port of each of the plurality of n lasers and the output of the stabilized laser system for filtering with a first predetermined spectral response as a function of wavelength and

concurrently multiplexing output wavelength signals received at a plurality of n first ports from the plurality of n lasers, respectively, to generate a first multiplexed output signal at a second port thereof for transmission as the output signal from the laser system, and for filtering with a second predetermined spectral response as a function of wavelength any signals being multiplexed while propagating between the first ports and a third port thereof, and a feedback signal being demultiplexed while propagating between the third port and the first ports thereof and fed back to the plurality of n lasers.

19(Original). The stabilized laser system of claim 18 wherein the feedback signal generating means further comprises one of a group consisting of (a) a power splitter comprising first and third ports coupled to the second and third ports of the forward multiplexer, and a second port for providing the output signal from the laser system, wherein a signal received at the first port thereof is split into first and second portions for delivery to the second and third ports thereof, respectively, and (b) a reflector coupled to the third port of the forward multiplexer for returning the received multiplexed signal as a feedback signal to said third port and in turn back to the plurality of n lasers.

20(Original). The stabilized laser system of claim 19 wherein the feedback signal generating means further comprises a delay line coupled in a path between the third ports of the each of the power splitter and the forward multiplexer.

21(Original). The stabilized laser system of claim 18 wherein the feedback signal generating means further comprises a power splitter comprising first, second, and third ports where the first and third ports thereof are coupled to the second and third ports, respectively, of the forward multiplexer such that the multiplexed signal received at the first port thereof is split into first and second portions and the first portion is transmitted via the second port thereof as the output signal from the laser system, and the second portion is delivered to the third port thereof as a feedback signal to the plurality of n lasers via the third and first ports of the forward multiplexer.

22(Original). The stabilized laser system of claim 21 wherein the laser system further comprises a plurality of n polarization rotators, each polarization rotator being coupled between a corresponding one of the plurality of n lasers and the corresponding one of the plurality of n first port of the forward multiplexer.

23(Original). The stabilized laser system of claim 21 wherein:

the forward multiplexer further comprises a fourth port and a plurality of n fifth ports;

the power splitter comprises a fourth port coupled to the fourth port of the forward multiplexer; and

the laser system further comprises an optional delay line coupled in the signal path between the fourth ports of the forward multiplexer and the power splitter.

24(Original). The stabilized laser system of claim 23 wherein the feedback signal generating means further comprises a plurality of n reflectors, each reflector being coupled to a corresponding one of the plurality of n fifth ports of the forward multiplexer.

25(Original). The stabilized laser system of claim 23 wherein the feedback signal generating means further comprises:

a first feedback multiplexer comprising a predetermined second spectral response, a plurality of n first ports, and a second port, each one of the plurality of n first ports is coupled to a corresponding one of the plurality of n fifth ports of the forward multiplexer for multiplexing wavelength signal received at the fifth ports to a multiplexed signal at the second port and vice versa; and

a reflector coupled to the second port of the first feedback multiplexer for returning a received signal back to said second port.

26(Original). The stabilized laser system of claim 25 wherein each multiplexer comprises one of a group consisting of an Arrayed Waveguide grating, Eschelle grating, Mach-Zehnder interferometer, bulk grating, thin film filters, and optical fiber filters.

27(Original). The stabilized laser system of claim 21 wherein:

the power splitter comprises a fourth port wherein a signal received at the fourth port is split into a first and

second portions and delivered to the second and third ports thereof, respectively; and

the feedback signal generating means further comprises:

a reflector coupled to the fourth port of the power splitter:, and

an optional delay line coupled in the signal path between the reflector and the fourth port of the power splitter.

28(Original). The stabilized laser system of claim 21 wherein:

the power splitter is a broadband power splitter further comprising a fourth port such that a signal received at the third port is split into first and second portions and delivered to the first and fourth ports, respectively, and a signal received at the fourth port is split into first and second portions and delivered to the second and third ports, respectively; and

the laser system further comprising:

a feedback multiplexer comprising a first port and a plurality of n second ports, the first port thereof being coupled to the fourth port of the power splitter;

a plurality of n reflectors, each of the reflectors being coupled to a corresponding one of the plurality of n second ports of the feedback multiplexer; and

an optional loop arrangement coupled in the path between the third port of the forward multiplexer and the third port of the broadband power splitter, the optional loop arrangement comprising:

a power splitter comprising a first, a second, a third, and a fourth port, the first and second ports being coupled to the third port of the forward multiplexer and the third port of the broadband power splitter, respectively, where signals received at the first and fourth ports thereof are split into first and second portions for delivery to the second and third ports thereof, respectively, and signals received at the second and third ports thereof are split into first and second portions for delivery to the first and fourth ports thereof, respectively; and

a feedback cavity comprising one of a group consisting of (a) an optional delay line coupled between the third and fourth ports of the power splitter, and (b) a combination of a first optional delay line coupled to the third port of the power splitter that is serially coupled to a first optional reflector, and a second optional delay line coupled to the fourth port of the power splitter that is serially coupled to a second optional reflector.

29(Original). The stabilized laser system of claim 8 wherein:

the at least one laser comprises a plurality of n lasers each laser generating a predetermined wavelength output signal at an output port thereof, and

the feedback signal generating means comprises:

a plurality of n first power splitters, each power splitter comprising first, second, and third ports, the first port being coupled to the output port of a corresponding one of

the plurality of n lasers for splitting a signal received from the corresponding laser into first and second portions which are delivered to the second and third ports, respectively, and vice versa; and

a forward multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to the second port of a corresponding one of the plurality of n power splitters, and the forward multiplexer couples the plurality of n first ports and the second port thereof while generating a multiplexed output signal using a respective first spectral response as a function of wavelength.

30(Original). The stabilized laser system of claim 29 wherein:

the forward multiplexer further comprises a third port and a plurality of n fourth ports, each of said fourth ports being coupled to a third port of a corresponding one of the plurality of n first power splitters, and the forward multiplexer functions to demultiplex the signals received at the third port using a second spectral response as a function of wavelength and delivering the demultiplexed signals to the corresponding one of the plurality of n fourth ports thereof, and vice versa; and

the feedback signal generating means further comprises a second power splitter comprising a first, second, and third port, the first port being coupled to the second port of the forward multiplexer, the second port providing the output of the stabilized laser system, and the third port being coupled to the third port of the forward multiplexer, the second power splitter

functioning to split a signal received at the first port into first and second portions which are delivered to the second and third ports thereof, respectively.

31(Original). The stabilized laser system of claim 30 further comprising a plurality of n polarization rotators, each polarization rotator being couple between a corresponding one of the plurality of n lasers and the plurality of n first power splitters.

32(Original). The stabilized laser system of claim 30 wherein:

each of the plurality of n first power splitters further comprises a fourth port such that any signals received at the second and third ports thereof is split into first and second portions thereof for delivery to the first and fourth ports thereof, respectively;

the second power splitter further comprises a fourth port such that any signals received at the second and third ports thereof is split into first and second portions thereof for delivery to the first and fourth ports thereof, respectively; and vice versa; and

the feedback signal generating means further comprising:

a feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a fourth port of a corresponding one of the plurality of n first power splitters, the second port being coupled to the fourth port of the second power splitter, and the feedback multiplexer functions to multiplex the signals received at the plurality of first ports using a second spectral response as a function of wavelength and delivering the multiplexed signal to the second port thereof, and vice versa; and

an optional delay line coupled in a signal path between the second port of the feedback multiplexer and the fourth port of the second power splitter.

33(Original). The stabilized laser system of claim 30 wherein the feedback signal generating means further comprises:

an optional loop arrangement coupled in the path between the third port of the forward multiplexer and the third port of the second power splitter, the optional loop arrangement comprising:

a power splitter comprising a first, a second, a third, and a fourth port, the first and second ports being coupled to the third port of the first feedback multiplexer and the third port of the second power splitter, respectively, where signals received at the first and fourth ports thereof are split into first and second portions for delivery to the second and third ports thereof, respectively, and signals received at the second

and third ports thereof are split into first and second portions for delivery to the first and fourth ports thereof, respectively; and

a feedback cavity comprising one of a group consisting of (a) an optional delay line coupled between the third and fourth ports of the power splitter, and (b) a combination of a first optional delay line coupled to the third port of the power splitter that is serially coupled to a first optional reflector, and a second optional delay line coupled to the fourth port of the power splitter that is serially coupled to a second optional reflector.

34(Original). The stabilized laser system of claim ~~30~~ 29 wherein:

each of the plurality of n first power splitters further comprises a fourth port such that any signals received at the second and third ports thereof is split into first and second portions thereof for delivery to the first and fourth ports thereof, respectively;

the laser system further comprises:

~~the~~ a second power splitter ~~further-comprises~~ comprising a first, second, third, and fourth port such that any signals received at the second and third ports thereof is split into first and second portions thereof for delivery to the first and fourth ports thereof, respectively, and vice versa; and

the feedback signal generating means further

comprising:

a first feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a fourth port of a corresponding one of the plurality of n first power splitters, the first feedback multiplexer functions to multiplex the signals received at the plurality of first ports using a second spectral response as a function of wavelength and delivering the multiplexed signal to the second port thereof, and vice versa;

a first reflector coupled to the second port of the first feedback multiplexer;

a second feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a third port of a corresponding one of plurality of n first power splitters, the second feedback multiplexer functions to multiplex the signals received at the plurality of n first ports using a third spectral response as a function of wavelength and delivering the multiplexed signal to the second port thereof, and vice versa;

an optional loop arrangement coupled in the path between the second port of the second feedback multiplexer and the third port of the second power splitter, the loop arrangement comprising:

a power splitter comprising a first, a second, a third, and a fourth port, the first and second ports being coupled to the second port of the second feedback multiplexer and the third port of the second power splitter, respectively, where signals

received at the first and fourth ports thereof are combined and split into first and second portions for delivery to the second and third ports thereof, respectively, and signals received at the second and third ports thereof are combined and split into first and second portions for delivery to the first and fourth ports thereof, respectively; and

a feedback cavity comprising one of a group consisting of (a) an optional delay line coupled between the third and fourth ports of the power splitter, and (b) a combination of a first optional delay line coupled to the third port of the power splitter that is serially coupled to a first optional reflector, and a second optional delay line coupled to the fourth port of the power splitter that is serially coupled to a second optional reflector;

a third feedback multiplexer comprising a plurlaity of n first ports and a second port, the second port being coupled to the fourth port of the second power splitter, the third feedback multiplexer functions to multiplex the signals received at the plurality of n first ports using a fourth spectral response as a function of wavelength and delivering the multiplexed signal to the second port thereof, and vice versa; and

a plurlaity of n second reflectors, each reflector being couple to a corresponding one of the plurality of n first ports of the third feedback multiplexer.

35(Currently Amended). The stabilized laser system of claim 29 wherein the feedback signal generating means further

comprises:

a feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a third port of a corresponding one of the plurality of n first power splitters, and the feedback multiplexer functions to multiplex the signals received at the plurality of first ports using a second spectral response as a function of wavelength and delivering the multiplexed signal to the second port thereof, and vice versa; and

a second power splitter comprising a first, second, and third port, the first port being coupled to the second port of the forward multiplexer, the second port providing the output of the stabilized laser system, and the third port being coupled to the second port of the feedback multiplexer, the second power splitter functioning to split a signal received at the first port into first and second portions which are delivered to the second and third ports thereof, respectively, and vice versa.
~~{COVERS FIGS. 8, 11, 23, and 38}~~

36(Original). The stabilized laser system of claim 35 wherein:

each of the plurality of n first power splitters further comprises a fourth port wherein a signal received at the fourth port is split into a first and second portions and delivered to the second and third ports thereof, respectively, and signals received at the second and third ports are split into a first and second portions and delivered to the first and fourth ports thereof, respectively;

the second power splitter further comprises a fourth port such that any signals received at the second and third ports thereof is split into first and second portions thereof for delivery to the first and fourth ports thereof, respectively, and vice versa; and

the feedback signal generating means further comprises a second feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a fourth port of a corresponding one of the plurality of n first power splitters, the second port thereof is coupled to the fourth port of the second power splitter, and the second feedback multiplexer functions to multiplex the signals received at the plurality of first ports using a third spectral response and delivering the multiplexed signal to the second port thereof, and vice versa;

37(Original). The stabilized laser system of claim 29 wherein the feedback signal generating means further comprises:

a feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to a third port of a corresponding one of the plurality of n first power splitters, the feedback multiplexer functioning to multiplex wavelength signals received at the plurality of first ports using a second spectral response and delivering the multiplexed signal to the second port thereof; and

a reflector coupled to the second port of the feedback multiplexer for returning a received signal back to said second port.

38(Original). The stabilized laser system of claim 37 wherein:

each of the plurality of n first power splitters further comprises a fourth port wherein a signal received at the fourth port is split into a first and second portions and delivered to the second and third ports thereof, respectively; and

the feedback signal generating means further comprises:

a second feedback multiplexer comprising a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to the fourth third port of a corresponding one of the plurality of n first power splitters, the second feedback multiplexer functioning to multiplex wavelength signals received at the plurality of first ports using a third spectral response and delivering the multiplexed signal to the second port thereof; and

a reflector coupled to the second port of the second feedback multiplexer for returning a received signal back to said second port.

39(Original). The stabilized laser system of claim 37 further comprising a plurality of n polarization rotators, each polarization rotator being couple between a corresponding one of the plurality of n lasers and the plurality of n first power splitters.

40(Original). The stabilized laser system of claim 39 further comprising:

a plurality of n polarization rotators, each polarization rotator being coupled between a corresponding one of the plurality of n lasers and the first port of a corresponding one of the plurality of n power splitters;

an optional delay line coupled in a signal path between the second port of the feedback multiplexer and the reflector; and

each of the forward and feedback multiplexer comprises one of a group consisting of an Arrayed Waveguide grating, Eschelle grating, Mach-Zehnder interferometer, bulk grating, thin film filters, and optical fiber filters.

41(Original). The stabilized laser system of claim 29 wherein:

the forward multiplexer further comprises a third port and a plurality of n fourth ports, and functions to demultiplex the signals received at the third port thereof using a second spectral response as a function of wavelength and delivering the demultiplexed signal to corresponding ones of the plurality of fourth ports, and vice versa, the plurality of n fourth ports being coupled to corresponding ones of the plurality of third ports of the plurality of n first power splitters; and

the feedback signal generating means further comprises a reflector coupled to the third port of the forward multiplexer for returning a received signal back to said third port.

42(Original). The stabilized laser system of claim 41 further comprising a plurality of n polarization rotators, each polarization rotator being couple between a corresponding one of the plurality of n lasers and the plurality of n first power splitters.

43(Original). The stabilized laser system of claim 8 wherein:

the at least one laser comprises a plurality of n lasers; and

the feedback generating means comprising:

a forward multiplexer comprising a first filter spectral response as a function of wavelength a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to an output port of a corresponding one the plurality of n lasers, and the second port being coupled to the output of the stabilized laser system;

a broadband power splitter comprising first, second and third ports, the first port being coupled to the second port of the forward multiplexer, the second port being coupled to the output of the stabilized laser system where a signal received at the first port is split into first and second portions for delivery to the second and third ports, respectively; and

a feedback multiplexer comprising a second filter spectral response as a function of wavelength, a plurality of first ports, and a second port, the second port being coupled to the third port of the broadband power splitter, and the plurality of first ports being coupled to one of a group consisting of (a)

a plurality of n reflectors coupled to a corresponding one of the plurality of first ports of the feedback multiplexer, and (b) a corresponding one of a plurality of n second ports of a second section of the feedback multiplexer further comprising a second port coupled to a reflector.

44(Original). The stabilized laser system of claim 43 wherein:

the broadband power splitter further comprises a fourth port; and

the feedback generating means further comprising:

a second feedback multiplexer comprising third filter spectral response as a function of wavelength, a plurality of first ports, and a second port, the second port being coupled to the fourth port of the broadband power splitter; and

a plurality of n reflectors, each reflector being coupled to a corresponding one the plurality of n second ports of the second feedback multiplexer.

45(Original). The stabilized laser system of claim 43 wherein:

the broadband power splitter further comprises a fourth port; and

the feedback generating means further comprising:

a second feedback multiplexer arrangement comprising a first and second multiplexer subsection thereof, third filter spectral response as a function of wavelength, and each multiplexer subsection comprises a plurality of first ports, and a second port, the second port of the first multiplexer

subsection being coupled to the fourth port of the broadband power splitter, and the plurality of n first ports of the first multiplexer subsection are coupled to corresponding ones of the plurality of n first ports of the second multiplexer subsection; and

a reflector coupled to the second port of the second multiplexer subsection.

46(Original). The stabilized laser system of claim 8 wherein:

the at least one laser comprises a plurality of n lasers; and

the feedback generating means comprising:

a forward multiplexer comprising a first filter spectral response as a function of wavelength a plurality of n first ports and a second port, each of the plurality of n first ports being coupled to an output port of a corresponding one the plurality of n lasers;

a first broadband power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the forward multiplexer, where signals received at the first and fourth ports are split into first and second portions for delivery to the second and third ports, respectively, and vice versa;

a second broadband power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first broadband power splitter, the second port being coupled to provide an output from the laser system,

where signals received at the first and fourth ports are split into first and second portions for delivery to the second and third ports, respectively, and vice versa;

a first feedback multiplexer arrangement comprising a second filter spectral response as a function of wavelength, a first and second feedback multiplexer subsection where each multiplexer subsection comprises a plurality of first ports, and a second port, the plurality of first ports of the first multiplexer subsection being coupled to corresponding ones of the plurality of n first ports of the second multiplexer subsection, the second port of the first multiplexer subsection being coupled to the third port of the first broadband power splitter, and the second port of the second multiplexer subsection being coupled to the third port of the second broadband power splitter.

47(Original). The stabilized laser system of claim 46 further comprising:

an optional delay line coupled in a path coupling the fourth ports of the first and second broadband power splitters.

48(Original). The stabilized laser system of claim 46 further comprising:

first and second broadband reflectors coupled to the fourth ports of the first and second broadband power splitters, respectively, through respective separate first and second optional delay lines.

49(Original). The stabilized laser system of claim 46 further comprising:

a second feedback multiplexer arrangement comprising a third filter spectral response as a function of wavelength, a first and second feedback multiplexer subsection thereof where each multiplexer subsection comprises a plurality of first ports, and a second port, the plurality of first ports of the first multiplexer subsection being coupled to corresponding ones of the plurality of n first ports of the second multiplexer subsection, the second port of the first multiplexer subsection being coupled to the fourth port of the first broadband power splitter, and the second port of the second multiplexer subsection being coupled to the fourth port of the second broadband power splitter.

50(Original). The stabilized laser system of claim 46 further comprising:

a second feedback multiplexer arrangement comprising a third filter spectral response as a function of wavelength, a first and second feedback multiplexer subsection thereof where each multiplexer subsection comprises a plurality of first ports, and a second port, the plurality of first ports of the first multiplexer subsection being coupled to corresponding ones of the plurality of n first ports of the second multiplexer subsection, the second port of the first multiplexer subsection being coupled to the fourth port of the first broadband power splitter;

a third feedback multiplexer arrangement comprising a fourth filter spectral response as a function of wavelength, a first and second feedback multiplexer subsection thereof where

each multiplexer subsection comprises a plurality of first ports, and a second port, the plurality of first ports of the first multiplexer subsection being coupled to corresponding ones of the plurality of n first ports of the second multiplexer subsection, the second port of the first multiplexer subsection being coupled to the fourth port of the second broadband power splitter; and

first and second broadband reflectors, the first reflector being coupled to the second port of the second multiplexer subsection of the second feedback multiplexer arrangement, and the second reflector being coupled to the second port of the second multiplexer subsection of the third feedback multiplexer arrangement.

51(Original). A stabilized laser system for generating a signal at an output thereof having a desired central wavelength comprising:

at least one laser, each laser thereof, which while emitting light at the desired central wavelength and having a preselected portion thereof fed back thereto, causes output signal of the at least one laser source to be shifted in wavelength in a first direction which is spaced apart from the central wavelength of the fed back signal;

a first and a second transmission filter, each transmission filter comprising a different wavelength spectral response and first and second ports;

an output signal from the laser being coupled to the input of the first transmission filter such that at least a first portion of any signal emitted by the laser is transmitted to the

first port of the first transmission filter, and the second port of the first transmission filter being coupled to an output of the stabilized laser system; and

the output of the laser being coupled to the first port of the second transmission filter such that at least a second portion of any signal emitted by the laser is transmitted to the first port of the second transmission filter, and the second port of the second transmission filter being coupled to the output of the laser such that any signal generated at the second port of the second transmission filter, whose spectral response peaks at a wavelength shifted in an opposite direction to that generated by the at least one laser in response to a feedback signal, is fed back to the laser so as to provide at the output of the stabilized laser system an output signal having a spectral response that peaks at the desired central wavelength.

52(Original). The stabilized laser system of claim 51 wherein the at least one laser is a single laser, and the laser system further comprises:

a power splitter comprising a first port coupled to one of a group consisting of (a) the output of the laser, and (b) the second port of the first transmission filter for splitting a signal received at a first port thereof into first and second portions for transmission from second and third ports, respectively, the second port being coupled to one of a group consisting of (a) the first port of the first transmission filter and (b) an output of the laser system, and the third port being coupled to the first port of the second transmission filter; and

a feedback arrangement coupled to the second port of the second transmission filter for directing an output signal therefrom back to the output of the laser comprising one of a group consisting of a reflector for returning an output signal at the second port from the second transmission filter back through the second transmission filter, and a loop coupling the second ports of the first and second transmission filters for returning the output signal from the second transmission filter back through the first transmission filter.

53(Original). The stabilized laser system of claim 52 wherein:

the second port of the second transmission filter is coupled to a reflector;

the power splitter further comprising a fourth port, the power splitter splitting a signal received at a fourth port thereof into a first and second portions for transmission from the second and third ports, respectively, and for splitting a signal received at each of the second and third ports thereof into a first and second portion for transmission from first and fourth ports, respectively; and

the stabilized laser system further comprises:

a third transmission filter comprising a spectral response which is different than that of the first and second transmission filters and a first and second port, the first port thereof being coupled to the fourth port of the power splitter; and

a second reflector coupled to the second port of the third transmission for returning a received signal back through the third transmission filter.

54(Original). The stabilized laser system of claim 52 further comprising a second power splitter comprising a first, second, and third port, where the first port is coupled to the second port of the first transmission filter for dividing the signal at the first port of the second power splitter into a first and second portions thereof for transmission from the second and third ports thereof, respectively, and vice versa, the second port thereof being coupled for transmitting the first portion as an output signal from the stabilized laser system, and the third port thereof being coupled to the second port of the second transmission filter.

55(Original). The stabilized laser system of claim 54 wherein each of the first and second power splitters is formed from one of a group consisting of a directional coupler (DC), a multimode interference (MMI) coupler, asymmetric Y junctions, a Mach-Zehnder interferometer, and free space optics using thin film.

56(Original). The stabilized laser system of claim 54 wherein:

the first and second power splitters each further comprise a fourth port, each power splitter splitting a signal received at a fourth port thereof into a first and second portions for transmission from the second and third ports, respectively, and for splitting a signal received at each of the

second and third ports thereof into a first and second portion for transmission from first and fourth ports, respectively; and

the stabilized laser system further comprises a third transmission filter comprising a spectral response as a function of wavelength which is different than that of the first and second transmission filters and a first and second port, the first port thereof being coupled to the fourth port of the second power splitter and the second port thereof being coupled to the fourth port of the first power splitter.

57(Original). The stabilized laser system of claim 51 further comprising:

a third transmission filter a different wavelength spectral response as a function of wavelength than the first and second transmission filters, and a first and second port;

a first power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first transmission filter, the third port being coupled to the first port of the second transmission filter, and the fourth port being coupled to the second port of the third transmission filter, where signals received at the first and fourth ports are split into a first and second portions thereof for transmission from the second port and third ports thereof, respectively, and vice versa, and signals received at the second and third ports thereof are split into a first and second portions for transmission from the first and fourth ports thereof, respectively, and vice versa; and

a second power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first power splitter, the second port providing an output signal from the laser system, the third port being coupled to the second port of the second transmission filter, and the fourth port being coupled to the first port of the third transmission filter, where signals received at the first and fourth ports are split into a first and second portions thereof for transmission from the second port and third ports thereof, respectively, and vice versa, and signals received at the second and third ports thereof are split into a first and second portions for transmission from the first and fourth ports thereof, respectively, and vice versa.

58(Original). The stabilized laser system of claim 51 further comprising:

a first power splitter comprising a first, second, third, and fourth port, the first port being coupled to the second port of the first transmission filter, the third port being coupled to the first port of the second transmission filter, and the fourth port being coupled to the second port of the second transmission filter, where signals received at the second and third ports thereof are split into first and second portions thereof for transmission from the first and fourth ports thereof, respectively, and vice versa;

a second power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first power splitter, the second port

providing the output signal from the laser system, and the third port being coupled to the second port of the second transmission filter, where signals received at the second and third ports thereof are split into first and second portions thereof for transmission from the first and fourth ports thereof, respectively, and vice versa; and

a third transmission filter comprising a spectral response as a function of wavelength which is different than that of the first and second transmission filters and a first and second port, the first port thereof being coupled to the fourth port of the second power splitter and the second port thereof being coupled to the fourth port of the first power splitter.

59 (Currently Amended). The stabilized laser system of claim 54 wherein:

the power splitter is a first power splitter and further comprises a fourth port where signals received and the first and fourth ports thereof are split into first and second portions that are delivered to the second and third ports, respectively, and a signal received at the third port is split into first and second portions that are delivered to the first and fourth ports, respectively; and

the laser system further comprises:

a second power splitter comprising first, second, third, and fourth ports, the first port thereof being coupled to an output port of the laser, the second port thereof being coupled ~~t~~ to the first port of ~~the first port of~~ the first

transmission filter, and the third port thereof being coupled to the first port of the second transmission filter;

a third and fourth transmission filter, each transmission filter comprising a separate spectral response as a function of wavelength that is different than the first and second spectral responses, and a first and second ports, the first port of the third and fourth transmission filters being coupled to the fourth ports of the first and second power splitters, respectively; and

a first and second reflector coupled to the second port of the third and fourth transmission filters, respectively.

60(Original). A stabilized laser system for generating a signal at an output thereof having a desired central wavelength comprising:

a plurality of n lasers, each laser, which while emitting light at the desired central wavelength and having a preselected portion thereof fed back thereto, causes the output signals of the plurality of n laser sources to be shifted in wavelength in a first direction which is spaced apart from the central wavelength of the fed back signal;

a multiplexer/filter arrangement comprising a forward multiplexer/filter section and a feedback multiplexer/filter section, each of the forward and feedback multiplexer/filter sections comprising a different wavelength spectral response as a function of wavelength, a plurality of n first ports, and a second port;

an output signal from each of the lasers being coupled to a corresponding one of the plurality of n first ports of the forward multiplexer/filter section such that at least a first portion of the output signal emitted by each of the lasers is transmitted to a corresponding one of the first ports of the forward multiplexer/filter section, and the second port of the forward multiplexer/filter section being coupled to an output of the stabilized laser system; and

the output signal from the second port of the forward multiplexer/filter section is further coupled to the second port of the feedback multiplexer/filter section wherein the received signal is demultiplexed and delivered to the plurality of n first ports of the feedback multiplexer/filter section and each of the plurality of n first ports is coupled to one of a group consisting of (a) a corresponding one of a plurality of n reflectors for returning a received signal back through the forward and feedback multiplexer/filter sections to the corresponding one of the plurality of n lasers, and (b) a second feedback multiplexer/filter subsection comprising a plurality of n first ports, and a second port, where each one of the plurality of n first ports thereof is coupled to a corresponding one of the plurality of n first ports of the first feedback multiplexer/filter subsection, and the second port thereof being coupled to one of a group consisting of a reflector, and a loop for returning the feedback signal through the forward multiplexer/filter to the output of the plurality of n lasers such that any signal generated at the second port of the second

multiplexer/filter subsection has a spectral response that peaks at a wavelength shifted in an opposite direction to that generated by each of the plurality of n lasers in response to a feedback signal so as to provide at the output of the stabilized laser system an output signal comprising a spectral response that peaks at the desired central wavelength.

61(Original). The stabilized laser system of claim 60 wherein:

the forward and feedback multiplexer/filter sections comprise different subsections of a same multiplexer/filter; and

the laser system further comprises a broadband power splitter comprising first, second, and third ports, the first port being coupled to the second port of the forward multiplexer/filter section, the second port being coupled to provide an output signal from the laser system, and the third port being coupled to the second port of the feedback multiplexer/filter section.

62(Original). The stabilized laser system of claim 61 wherein each of the forward and feedback multiplexer/filter sections comprises one of a group consisting of an Arrayed Waveguide grating, Eschelle grating, Mach-Zehnder interferometer, bulk grating, thin film filters, and optical fiber filters.

63(Original). The stabilized laser system of claim 61 wherein:

the broadband power splitter further comprises a fourth port where signals received at the first and fourth ports are

split into first and second portions thereof and delivered to the second and third ports thereof, respectively, and vice versa; and

the laser system further comprises:

a reflector coupled to the fourth port of the broadband power splitter; and

an optional delay line coupled between said reflector and the fourth port of the broadband power splitter.

64(Original). The stabilized laser system of claim 61 wherein:

the feedback multiplexer/filter section comprises the first and second multiplexer/filter subsections, the first multiplexer/filter subsection being formed from a subsection of the forward multiplexer/filter section and the second feedback multiplexer/filter subsection being spaced apart from the first multiplexer/filter subsection;

the broadband power splitter further comprises a fourth port where signals received at the first and fourth ports are split into first and second portions thereof and delivered to the second and third ports thereof, respectively, and vice versa; and

the laser system further comprises:

a reflector coupled to the fourth port of the broadband power splitter; and

an optional delay line coupled between said reflector and the fourth port of the broadband power splitter.

65(Original). The stabilized laser system of claim 64 further comprising:

a second broadband power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first power splitter, the second port being coupled to provide an output signal from the laser system, the third port being coupled to the second port of the second feedback multiplexer/filter subsection where signals received at the first and fourth ports are split into first and second portions thereof and delivered to the second and third ports thereof, respectively, and vice versa;

a second reflector coupled to the fourth port of the second broadband power splitter; and

an second optional delay line coupled between said second reflector and the fourth port of the second broadband power splitter.

66(Original). The stabilized laser system of claim 61 wherein:

the feedback multiplexer/filter section comprises the first and second multiplexer/filter subsections, the first multiplexer/filter subsection being formed from a subsection of the forward multiplexer/filter section and the second feedback multiplexer/filter subsection being spaced apart from the first multiplexer/filter subsection; and

the broadband power splitter is a first power splitter and further comprises a fourth port; and

the laser system further comprises:

a second broadband power splitter comprising first, second, third, and fourth ports, the first port being coupled to the second port of the first power splitter, the second port being coupled to provide an output signal from the laser system, the third port being coupled to the second port of the second feedback multiplexer/filter subsection where signals received at the first and fourth ports are split into first and second portions thereof and delivered to the second and third ports thereof, respectively, and vice versa; and

the fourth ports of the first and second broadband power spitters are coupled together through an optional delay line.

67(Original). A method of stabilizing a laser system to generate an output signal at a desired center wavelength comprising the steps of:

(a) generating a light signal at a desired central wavelength at an input/output of a laser, which, while emitting light at the desired center wavelength and having a preselected portion thereof fed back thereto, causes the output signal of the laser to be shifted in wavelength in a first direction which is spaced apart from the center wavelength of the fed back signal;

(b) dividing the signal from the laser into a first and a second portion, said first portion being coupled to an output of the laser system;

(c) processing the second portion of the signal such that the wavelength is shifted in an opposite direction to the first direction; and

(d) feeding back the processed second portion of the signal to the input/output of the laser such that the output signal of the laser system is at essentially the desired wavelength.

68(Original). The method of claim 67 wherein in step (c), performing the step of:

(c1) transmitting the second portion through a transmission filter having a spectral response that shifts the second portion in the opposite direction from the first direction.

69(Original). The method of claim 68 wherein in step (c), performing the additional substep of:

(c2) causing the processed second portion to be reflected back through the transmission filter.

70(Original). The method of claim 67 wherein in step (c), performing the substep of:

(c1) transmitting the first and second portions through first and second bidirectional paths, respectively, of a transmission filter having a first spectral response when processing the first portion propagating in the first directional path, and a second spectral response when processing the second portion propagating in the second directional path.

71(Original). The method of claim 70 wherein in step (c), performing the additional step of:

(c2) transmitting the processed second portion through a loop and back through the first path of the transmission filter to the output of the laser.

72(Original). The method of claim 70 wherein in step (c), performing the additional step of:

(c2) transmitting the processed second portion to impinge a reflector and sent back through the second path of the transmission filter to the output of the laser.

73(Original). A method of stabilizing a laser system to generate an output signal at a desired central wavelength comprising the steps of:

(a) generating a light signal at a desired central wavelength at an input/output of each of a plurality of n laser sources, each laser source, which, while emitting light and having a preselected portion thereof fed back thereto, the output signal thereof is shifted in wavelength in a first direction which is spaced apart from a desired central wavelength of the fed back signal;

(b) dividing the signal from the plurality of n laser sources into a first and a second portions thereof, said first portion being multiplexed before being coupled to an output of the laser system;

(c) processing each of the second portions of the output signals from the plurality of n laser sources such that

the wavelength thereof is shifted in an opposite direction to the first direction; and

(d) feeding back each of the processed second portions of the signals from step (c) back to the input/output of a corresponding one of the plurality of n laser sources such that the output signal of the laser system is at essentially the desired wavelength.

74(Original). The method of claim 72 wherein in step (c), performing the substeps of:

(c1) transmitting each of the second portions through a multiplexer/filter having a spectral response that shifts each of the second portions in the opposite direction from the first direction while concurrently multiplexing the second portions into a multiplexed output signal; and

(c2) demultiplexing the multiplexed output signal from the multiplexer/filter of step (c1) prior to performing step (d).

75(Original). The method of claim 74 wherein in step (c2), performing the substep of:

(c3) causing the multiplexed output signal from the multiplexer/filter in step (c1) to be reflected back through the multiplexer/filter prior to performing step (c2).

76(Original). The method of claim 73 wherein in step (c), performing the substep of:

(c1) transmitting the first and second portions through first and second bidirectional paths, respectively, of a multiplexer/filter having a first spectral response when processing the first portions, and a second spectral response

that shifts the second portions in the opposite direction from the first direction.

77(Original). The method of claim 76 wherein in step (c1), performing the additional substep of:

(c2) transmitting the processed second portions through a loop and back through the first path of the multiplexer/filter to the output of each of the plurality of n laser sources.

78(Original). The method of claim 76 wherein in step (c), performing the additional substep of:

(c2) transmitting the processed second portions to impinge a reflector and sent back through the second path of the transmission filter to the output of a corresponding one of the plurality of n laser sources.